

# **Low Impact Development Design Standards for the City of Salinas**

**Workshop No. 2**

**August 10, 2006**

## **Salinas Soils and Shallow Groundwater Tools for Selecting Treatment Controls & LID Practices**



**California Environmental Protection Agency  
CENTRAL COAST REGIONAL  
WATER QUALITY CONTROL BOARD**

**Kennedy/Jenks Consultants**

# GIS Maps of Salinas Soil and Shallow Groundwater Data

National Resource Conservation Service (NRCS)

Soil Drainage Class, Runoff Potential, Saturated Hydraulic Conductivity, Available Soil Water Capacity, Clay Content

United States Geological Survey (USGS)

6 monitoring wells with shallow GW info

State Water Resource Control Board (Geotracker)

61 LUFT sites - shallow GW info

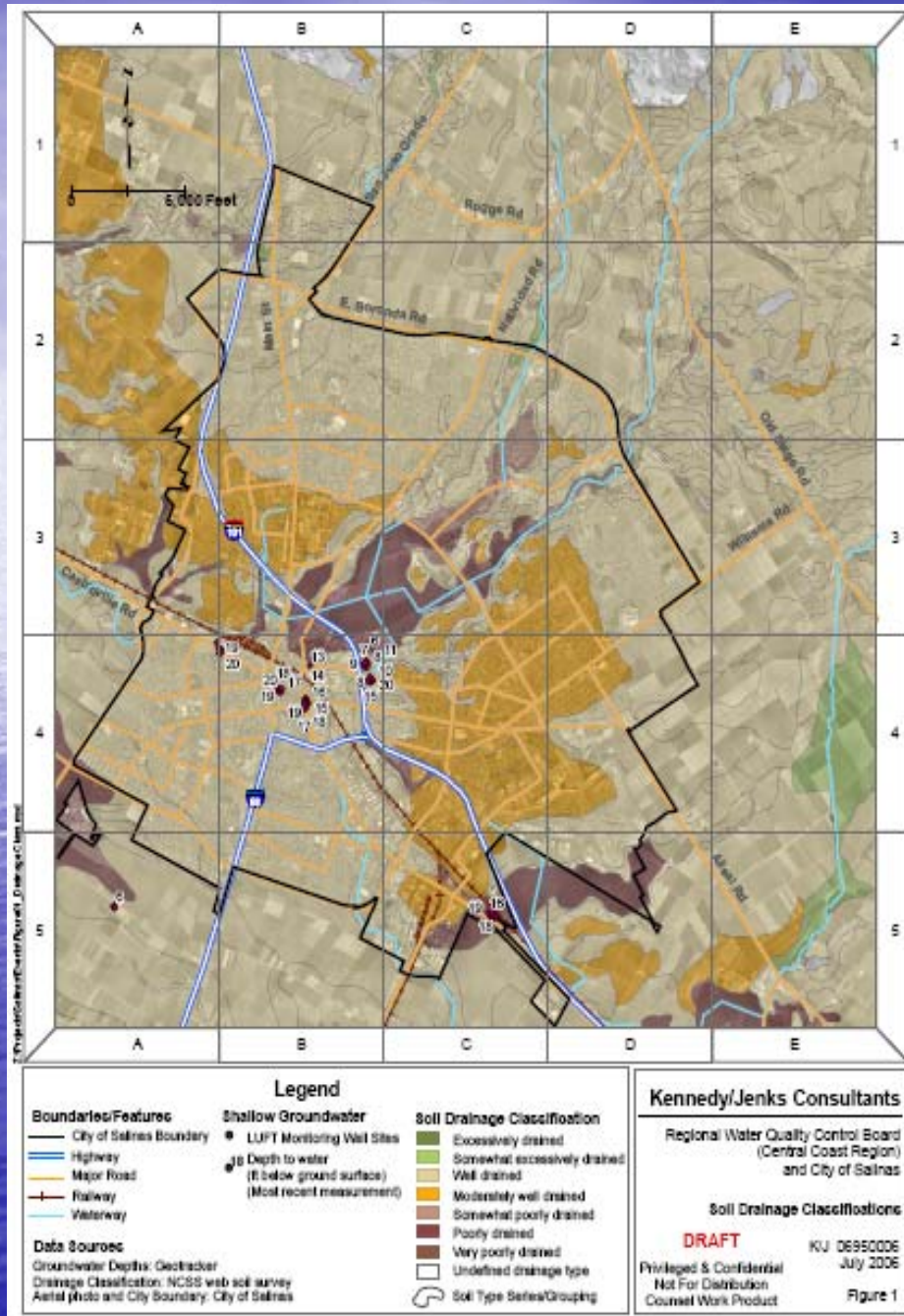
Monterey County Water Resources Agency

Additional data?



# Drainage Class

Frequency and duration of wet periods under natural conditions







## Soil Drainage Classification

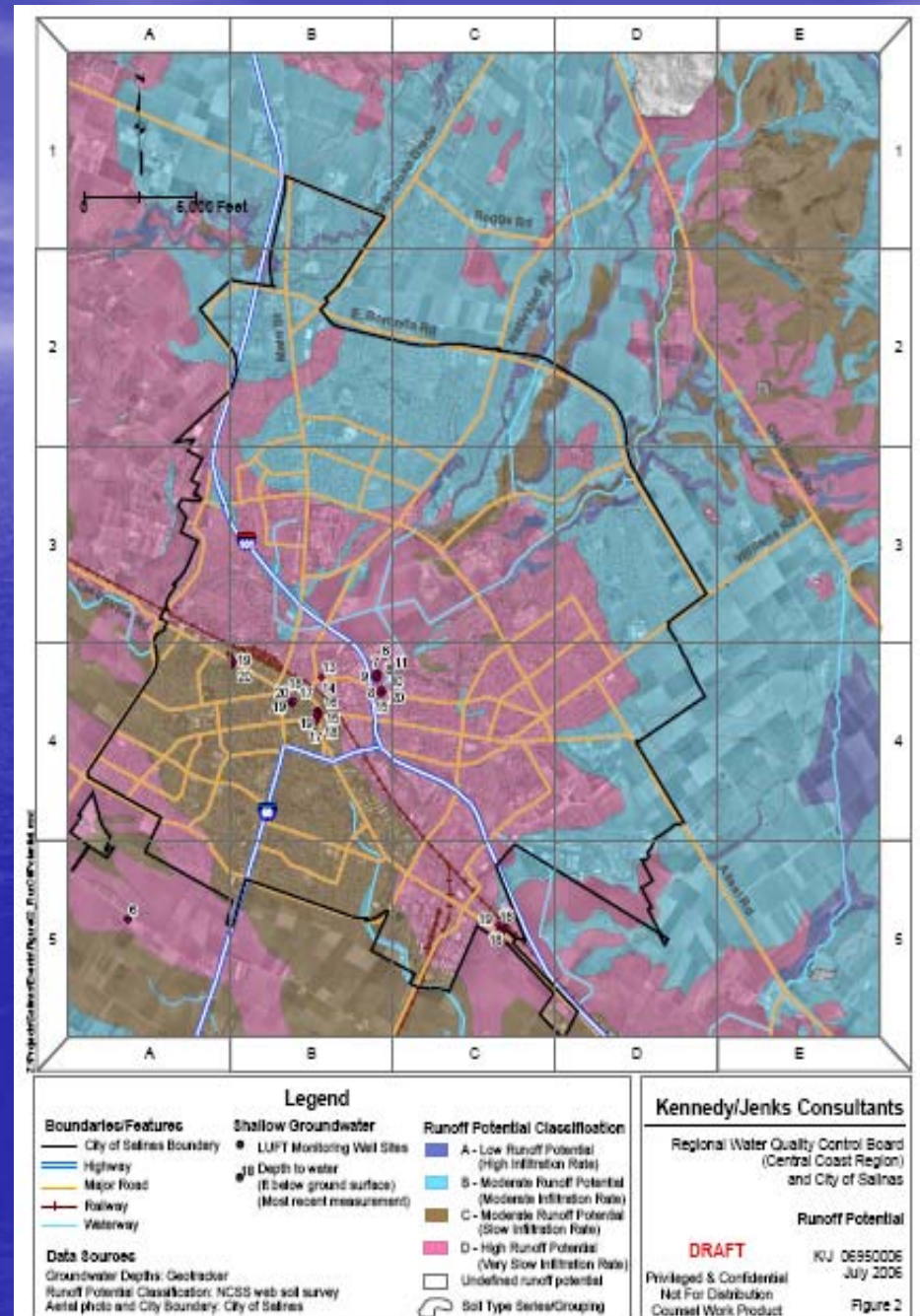
	Excessively drained
	Somewhat excessively drained
	Well drained
	Moderately well drained
	Somewhat poorly drained
	Poorly drained
	Very poorly drained

# Runoff Potential

## NRCS Hydrologic Soils Groups (A, B, C, D)

### Runoff Potential Classification

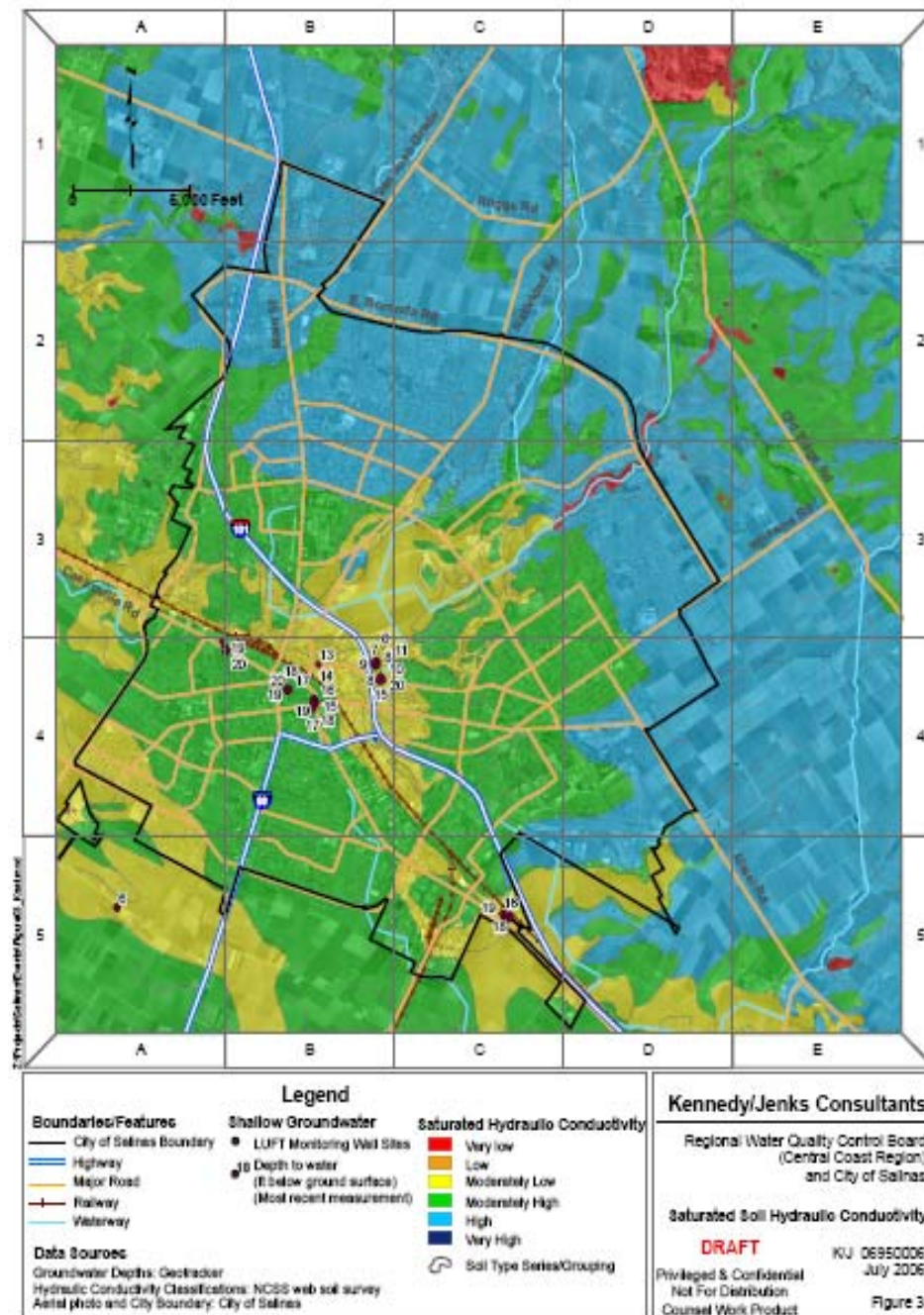
-  A - Low Runoff Potential  
(High Infiltration Rate)
-  B - Moderate Runoff Potential  
(Moderate Infiltration Rate)
-  C - Moderate Runoff Potential  
(Slow Infiltration Rate)
-  D - High Runoff Potential  
(Very Slow Infiltration Rate)





# Saturated Hydraulic Conductivity

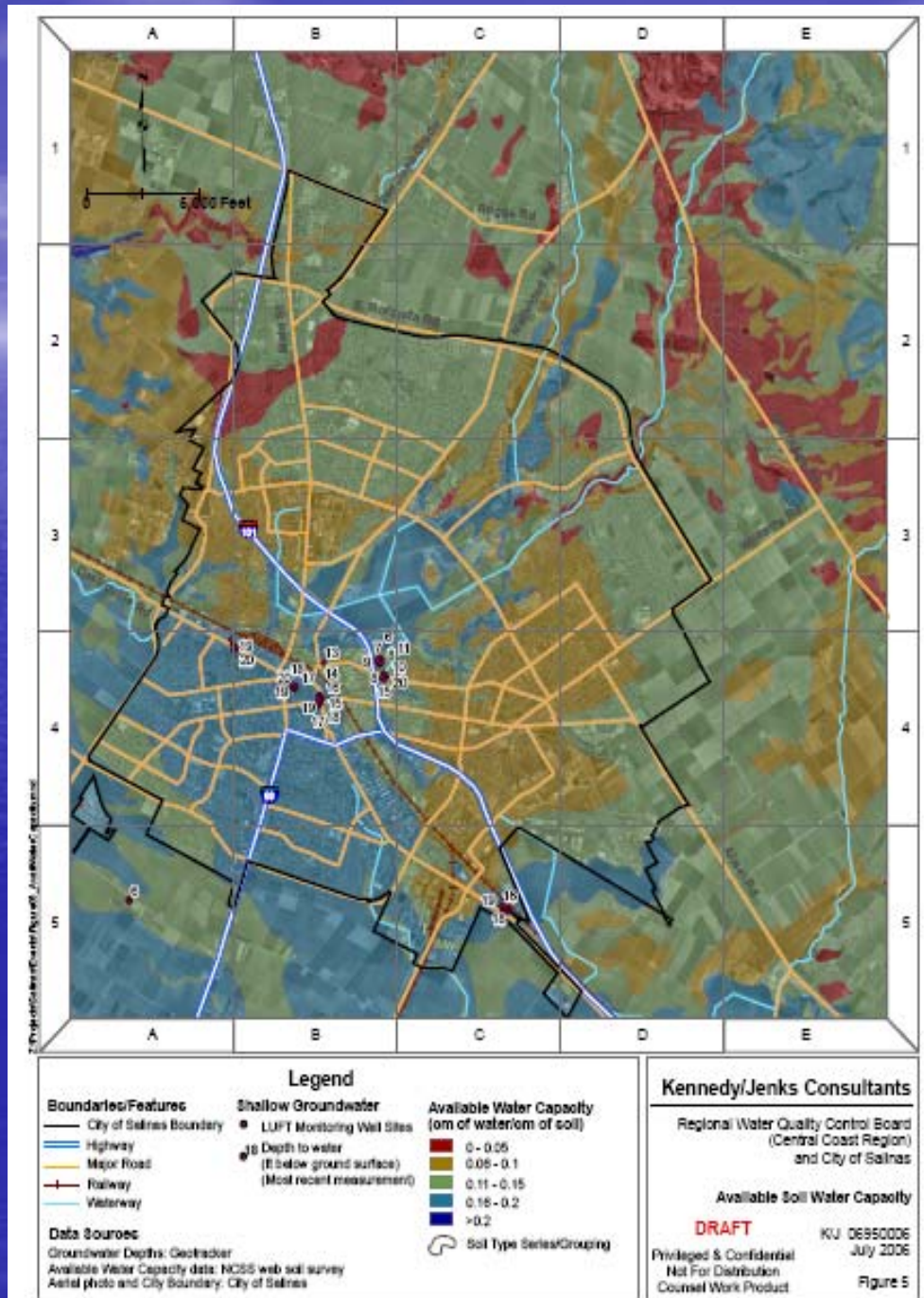
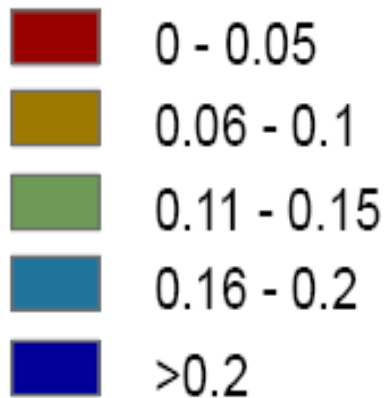
Ability of soil pores to transmit water



# Available Water Capacity

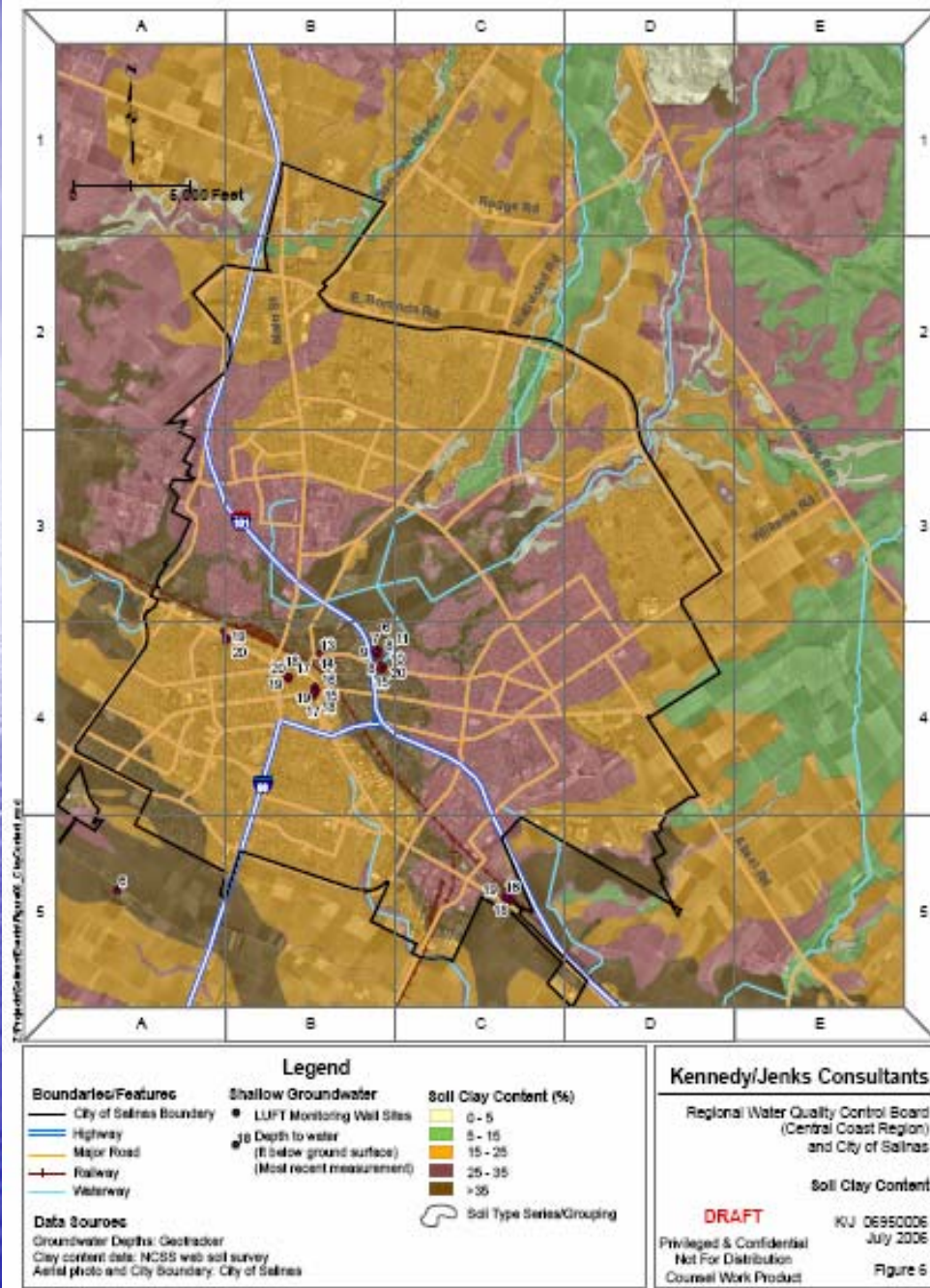
Quantity of water  
soils can store

## Available Water Capacity (cm of water/cm of soil)





# Soil Clay Content

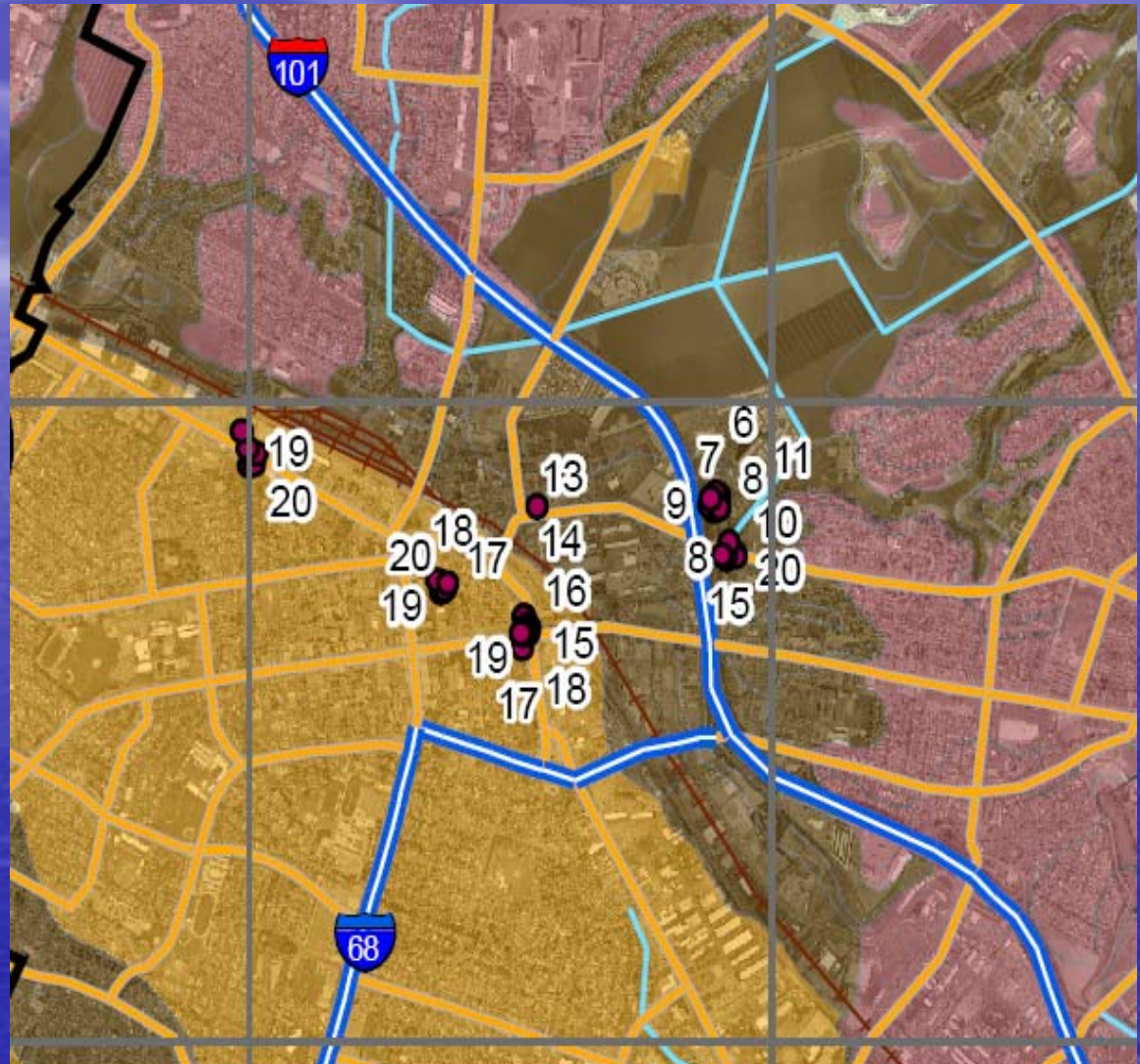




# Shallow Groundwater

## Shallow Groundwater

- LUFT Monitoring Well Sites
- 18 Depth to water  
(ft below ground surface)  
(Most recent measurement)





# Summary of Salinas Soil and Shallow Groundwater Data Review

- GIS Maps should be used at a preliminary planning level for siting infiltration systems
- If infiltration systems are proposed, site specific infiltration testing should be conducted
- Recommended infiltration testing method – Monterey County Health Dept Septic System Leach Field Test (U.S.EPA Manual of Septic Tank Practices)
- Permit infiltration systems if testing results are between 0.5 to 2.4 in/hr (120 to 25 min/in)

# Tools for Selection of Treatment Controls & LID Practices

Treatment Control Group	Treatment Control Design	Design Matrix 1. Land Use					
		Rural	Residential	Roads and Highways	Commercial/High Density	Hotspots	Ultra Urban
Vegetative Treatment Systems	TC-10 Vegetated Swales	S	S	S	S	S	S
	TC-11 Vegetated Buffer Strips	A	A	S	S	S	S
Infiltration Systems	TC-20 Infiltration Trenches	A	A	A	A	X	S
	TC-21 Infiltration Basins	A	A	A	A	X	S
Bioretention Systems	TC-30 Landscape Detention	A	A	A	A	S	A
Extended Detention Basins	TC-40 Sedimentation Basins	A	A	S	A	S	S
	TC-41 Sand Filter Basins	A	A	S	A	S	A
Ponds and Constructed Wetlands	TC-50 Storm Water Ponds	A	A	A	S	A	X
	TC-51 Storm Water Wetlands	A	A	S	S	A	X
Media Filtration Systems	TC-60 Surface Sand Filter	X	S	A	A	A	A
	TC-61 Underground Sand Filter	X	S	S	A	A	A
	TC-62 Porous Pavement	S	S	S	A	X	S
Oil and Water Separators	TC-70 Oil and Water Separators	S	S	S	A	A	A
		A = Applies under most conditions S = Applies under some conditions X = Not applicable					



		Design Matrix 2. Site Physical Features				
Treatment Control Group	Treatment Control Design	Soils	Water Table	Drainage Area (AC)	Site Slope	Head (ft)
Vegetative Treatment Systems	TC-10 Vegetated Swales	Native or engineered soils	>3 feet	10 max	No more than 5%	3 to 5 ft
	TC-11 Vegetated Buffer Strips			5 max	No more than 10%	NA
Infiltration Systems	TC-20 Infiltration Trenches	Min infiltration rate 0.5 inch/hr	>3 feet	10 max	Generally no more than 20%	~ 1 ft
	TC-21 Infiltration Basins			5 to 50	Generally no more than 15%	3 to 5 ft
Bioretention Systems	TC-30 Landscape Detention	Imported soil	>3 feet	1 max	Generally no more than 20%	~ 5 ft
Extended Detention Basins	TC-40 Sedimentation Basins	Native or engineered soils	>3 feet	5 min	Generally no more than 20%	~4 ft
	TC-41 Sand Filter Basins			10 max	Generally no more than 20%	~4 ft
Ponds and Constructed Wetlands	TC-50 Storm Water Ponds	HSG A soils may require liner	>3 feet	25 min	Generally no more than 15%	6 to 8 ft
	TC-51 Storm Water Wetlands				Generally no more than 8%	3 to 5 ft
Media Filtration Systems	TC-60 Surface Sand Filter	Native or engineered soils	>3 feet	5 max	Generally no more than 6%	~ 5 ft
	TC-61 Underground Sand Filter			1.5 max	Generally no more than 6%	5 to 7 ft
	TC-62 Porous Pavement			No Limit	Generally no more than 5%	NA
Oil and Water Separators	TC-70 Oil and Water Separators	Native or engineered soils	NA	No Limit	Generally no more than 10%	3 to 5 ft

Treatment Control Group	Treatment Control Design	Design Matrix 3. Storm Water Management Capability			
		Water Quality	Recharge	Channel Protection	Flood Control
Vegetative Treatment Systems	TC-10 Vegetated Swales	A	S	S	S
	TC-11 Vegetated Buffer Strips	A	S	A	X
Infiltration Systems	TC-20 Infiltration Trenches	A	A	S	S
	TC-21 Infiltration Basins	A	A	S	S
Bioretention Systems	TC-30 Landscape Detention	A	S	S	S
Extended Detention Basins	TC-40 Sedimentation Basins	A	S	S	A
	TC-41 Sand Filter Basins	A	S	S	A
Ponds and Constructed Wetlands	TC-50 Storm Water Ponds	A	S	S	A
	TC-51 Storm Water Wetlands	A	S	S	A
Media Filtration Systems	TC-60 Surface Sand Filter	A	X	S	S
	TC-61 Underground Sand Filter	A	X	S	S
	TC-62 Porous Pavement	A	S	S	S
Oil and Water Separators	TC-70 Oil and Water Separators	S	X	X	X
		A = Practice generally meets storm water management goals S = Practice can provide some benefit depending on site constraints X = Practice can rarely be used to meet this goal			



		Design Matrix 4. Community and Environmental Factors					
Treatment Control Group	Treatment Control Design	Cold Climate Limitations	Ease of Maintenance	Affordability	Community Acceptance	Safety	Habitat
Vegetative Treatment Systems	TC-10 Vegetated Swales	M	M	H	H	H	L
	TC-11 Vegetated Buffer Strips	M	M	H	H	H	L
Infiltration Systems	TC-20 Infiltration Trenches	M	M	M	M	H	L
	TC-21 Infiltration Basins	M	M	M	M	H	L
Bioretention Systems	TC-30 Landscape Detention	M	M	M	H	H	M
Extended Detention Basins	TC-40 Sedimentation Basins	M	M	M	H	M	L
	TC-41 Sand Filter Basins	M	M	M	H	H	L
Ponds and Constructed Wetlands	TC-50 Storm Water Ponds	M	M	M	M	M	H
	TC-51 Storm Water Wetlands	M	M	M	M	M	H
Media Filtration Systems	TC-60 Surface Sand Filter	L	M	L	M	M	L
	TC-61 Underground Sand Filter	H	M	L	H	H	L
	TC-62 Porous Pavement	L	M	M	H	H	L
Oil and Water Separators	TC-70 Oil and Water Separators	H	M	M	H	H	L
		H = High benefit and/or low limitations M = Medium benefit and/or limitations L = Low Benefit and/or high limitations					

